

A NEW MODEL FOR CONSISTENCY CENTERED MAINTENANCE IN PETROLEUM REFINERY

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ABSTRACT

Refiners today work their hardware for delayed periods without shutdown. This is mainly because of the expanded weights of the business sector bringing about stretched out shutdown-to-shutdown interims. This spots compelling requests on the plant's dependability hardware. The conventional routines for dependability confirmation, similar to Preventive Maintenance, Predictive Maintenance and Condition Based Maintenance get to be insufficient even for such requests. The substitute ways to deal with unwavering quality change, being embraced the world over are the usage of RCFA projects and Reliability Centered Maintenance. However, refiners and procedure plants think that it's hard to adopt this traditional approach of RCM mainly because of the multifaceted nature and the comprehensive measure of investigation that should be done, bringing about a protracted execution, obliging the administrations of various talented individuals. These outcomes in either a usage limited to just few gear or then again, one that is non-standard. The paper exhibits the present models being used, the center necessities of a standard RCM model, the different options for traditional RCM, confinements in the current model, established RCM and accessible distinct options for RCM and will then go ahead to introduce an Accelerated methodology conformance to the standard, does not put a substantial weight on the implementers.

KEYWORDS: *Reliability, Petroleum Refining, Maintenance Management & Statistical Analysis*

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INTRODUCTION

A previous couple of years have seen the tremendous weight on oil refineries in India, with edges frequently dropping underneath zero is presented in (dekker 1996)(bp 2012)(mobley 2002)(renwick 1985). This has constrained Indian refiners to amplify their shutdown periods furthermore take a gander at running their units over the appraised limit, and Indian refineries contribute 5.4% of the universes refining with just 4.5% of the limit (OISD 2008)(nowlan 1978). While working edges are accessible in a gear's couple, this method of operation spots huge strain on most hardware furthermore on the unwavering quality certification of these supplies. Extra weight on working expenses is likewise being felt because of the spiralling expenses of built segments is explained in (moubray 2001)(Prabhakar 2002)(Jayakumar 2017)(Krishnan 2017). This has constrained refiners to look towards more current methods for unwavering quality affirmation of their hardware. The routine reaction to an expanded unwavering quality need has been the execution of Predictive Maintenance (PdM), or Condition Based Maintenance (CbM) programs are described in(antaki 2003). While this is sufficient to guarantee a sure level of unwavering quality, insignificant usage of PdM or CbM has, while giving some level of change in dependability has not secured ceaselessly enhancing unwavering quality. As of late, refineries have begun to embrace procedures from outside the procedure business like RCM, TPM and Six-Sigma to accomplish change in dependability

(Carnero 2006) Of these, Reliability Centered Maintenance (RCM) has discovered some level of ubiquity.

The paper will depict the present models of upkeep by and large and in Indian refineries correctly, the procedure of routine RCM execution, the confinements of both, the necessities from another model for RCM, the advancement of the new model and the way to deal with actualizing these models in refineries is discussed in (Wu 2016).

Study of wear in chrome plated cylinder liner in two-stroke marine diesel engines lubricated by Hans Jensen swirl injection principle is discussed the Mechanical, Thermal, Linear and Nonlinear optical properties of Barium L-Tartrate single crystal is approached in (Igboanugo 2016).

EXISTING MODEL

The support reaction to the requirement for averting disappointments has been to have a Predictive Maintenance program that has both condition-based undertakings and time-driven assignments (prabhakar 2002). Condition-based errands are gotten principally from Vibration examination (Renwick 2004). Time-driven projects usually emerge out of hardware producer suggestions and are expectedly alluded to as PM Tasks or PM Plans. Notwithstanding the PM Plans and the PdM arranges, most associations utilise a Root Cause Failure Analysis program (RCFA). On account of Indian refineries, the Oil Industry Safety Directorate (OISD) has through its guidelines determined the kind of support procedures to be embraced by these factories.

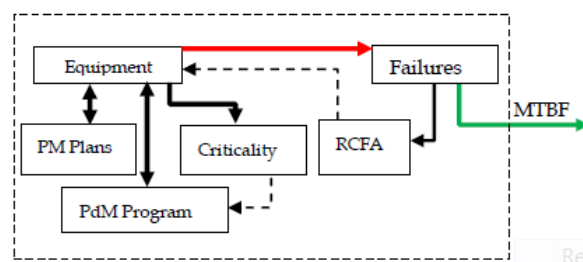


Figure 1: Existing model

These gauges endorse that as a base, the refineries have a PM Program (OISD Standard 2008), a PdM program and a RCFA program. This guarantees that a previous level of unwavering quality affirmation is accomplished in these plants. The creator's refinery additionally uses sorted MTBF as hardware's measure dependability from mid-2002. Pull-in voltage study of the variously structured cantilever and fixed-fixed beam models using COMSOL Multiphysics (Nivetha 2015). Considering these truths the present model of support and unwavering quality confirmation honed when all is said in done in Indian refineries is shown in figure 1.

LIMITATIONS OF THE EXISTING MODEL

One of the essential issues identifying with the current model is that it is a static model. When a PM or PdM project has been produced the activities don't change naturally in light of the watched execution of the system. While a RCFA system does create disappointment causes, this just results in the gears up gradation or substitution of a low part by an unrivalled segment. This model does location centre issues with the dependability of hardware yet has the accompanying lacks:

- The model does not acknowledge inputs from sources other than the device itself
- Equipment needs to experience a disappointment before the restorative activities kick in

- Model regards all hardware as alike and settles on PM and PdM gave a onetime criticality examination
- PM and PdM projects don't fluctuate with time.

As expressed before, the established or traditional RCM created by Nowlan & Heap did produce by a methodology that can be executed in a broad range of commercial enterprises by Moubray and in the SAE standard. The routine RCM execution portrayed in the controlling standard distributed by SAE is through a 7-stage process. The strides included were quickly depicted beneath:

- Functional Failures
- Function
- Failure Modes
- Failure Effects
- Failure Consequences

LIMITATIONS OF CONVENTIONAL RCM

The customary RCM methodology has some real restrictions that keep the application in refineries.

Reasonable Likelihood

Sensible probability is frequently depicted as the _a probability that meets the test of sensibility when connected via prepared and proficient individuals. Then again, indeed this is hard to accomplish and can bring about question between the implementers and the verifiers, principally because of the absence of a target measure of sensibility. This strength the implementers to default to doing a FMECA on the hardware. Truth be told one of the significant reactions from the traditional school of RCM against any substitute drew closer has been the foundation of sensible probability.

RELATED WORKS

Jagathy Raj- Support administration methodologies have been developing after some time and beginning from the idea of Breakdown upkeep, differed techniques like Condition Based Maintenance, Total Productive Maintenance and Reliability Centered Maintenance are by and by. The creators had built up the other support methodology – Accelerated Reliability Centered Maintenance particularly for use in process enterprises. Each of these techniques has particular points of interest and add a couple of confinements. The creators build up a method for correlation of these methodologies on the premise of setting up strategies and drawing on the ability development strategy. This paper specifies the striking highlights of CBM, TPM, RCM and A-RCM and presents a subjective correlation of these systems to give implementers, principally from the procedure business, with a prepared guide that will help in settling on the reception of one of these methodologies.

Al-Turki - Maintenance is one of the significant exercises in assembling as it acutely impacts generation quality and amount and straightforwardly influences creation cost and consumer loyalty. As new assembling advances rise and worldwide correspondence progresses, further support hones are created to adapt to these progressions. The part of support in keeping up resource esteem after some time is getting more unmistakable at the business level with the expansion in its obtaining and upkeep costs. In this section, different assembling frameworks are present alongside their definite highlights

that impact support techniques and practices. Systems of support administration ideas, methods of insight, strategies, and practices in assembling are quickly portrayed and examined in this part.

FMECA

The best way to remove the uncertainty in guaranteeing sensibility would be to do Failure, Mode, Effects and Criticality Analysis (FMEA or FMECA) on their gear as proposed in the process created by Moubray. The typical way to deal with evaluating to do FMECA is the gear from the configuration edge and this outcome in an execution that includes assessing a vast number of disappointment modes per hardware. The technique for FMECA was institutionalised in the MIL standard MIL-1629A and the IEC standard 60812. Considering that there are 33 failure modes endorsed in IEC812 which should be assessed, the aggregate number of examinations for a medium size refinery would be to the request of almost 50000, expecting that medium measured factories have near 2000 turning apparatus. This makes the assignment of completing FMECA exceptionally tedious. It is currently entirely clear that refiners with restricted labour are not in a position to achieve this examination in a little time span.

ALTERNATIVES TO RCM AND LIMITATIONS

Numerous distinct options for RCM have been proposed. These exchanges can be best isolated as examination driven and specialist driven. Examination driven methodologies, where countless with numerical or probabilistic drew nearer have been recommended, have not discovered numerous pragmatic applications fundamentally because of the elevated amounts of ability, frequently scientific, needed in taking care of these models. Truly a couple of specialist driven methodologies have additionally been proposed – unmistakable among them being the Streamlined RCM (or SRCM), the PM Optimization (PMO) from Turner and TPM which in India is initiated by the Confederation of Indian Industries (CII).

SRCM

Streamlined RCM or SRCM is a methodology that has been advanced as rearranging the RCM execution and was at first connected with the atomic business. This technique comprises of —identifying the disappointment mode that every current upkeep assignment should be anticipating and afterwards work forward again through the last three stages of the RCM choice procedure to evaluate the results of every disappointment and to distinguish a more financially savvy disappointment administration policy. Further, this methodology focuses on breaking down basic hardware, basic disappointments and focusing on the last three stages of the RCM process. SRCM has been scrutinized for being engaged more on upkeep cost advancement as opposed to on unwavering quality change

PROPOSED WORK

As has been portrayed before, RCM is a demonstrated instrument for constant, unwavering quality change. In any case, there is a requirement for guaranteeing speedier usage and improving the procedure of execution. In light of the feedback of the past ways to deal with improving the procedure the accompanying can be considered as least prerequisites for the new model:

- The procedure ought to consider the current upkeep practices and results
- All disappointment modes that are sensibly prone to happen must be considered
- Discriminating gear requires more serious investigation

- The model ought to give comes about rapidly
- The outcomes ought to be quantifiable at a large scale level
- The new model ought to incorporate with existing practices.

THE A-RCM MODEL

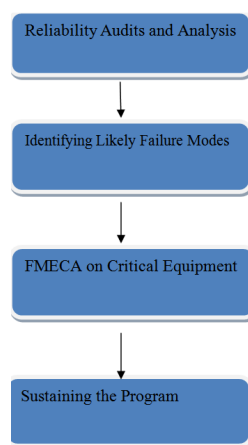
In the former area, the centre necessities of another model were produced. These necessities can be interpreted as Inputs, Desired Outputs and Parameters for estimation.

- The Model Definition
- Inputs to the Model

The key inputs that the new model requires are:

- Equipment Criticality
- Equipment History of the populace
- Failure methods of past disappointments
- Existing Preventive & Predictive Program.

METHODOLOGY



RESULT AND DISCUSSIONS



Figure 3: Reliability Value Chain

Research also shows that a top-quartile performing organization possesses a ‘Reliability Value Chain’, a set of well-linked elements in four categories: data, information, knowledge, and action — as shown in Figure. This sets the path for transforming data into information, into knowledge, and into action. Ultimately, the ability to achieve top performance status is dependent on the robustness of each element and, perhaps more importantly, on the effective connectedness of all of the elements into a continuous improvement cycle.

CONCLUSIONS

Petroleum refineries require to a great degree large amounts of gear unwavering quality. The unwavering quality confirmation in such commercial ventures is damaged by the extensive number of gear, the framework's intricacy, the scarcity of staff to complete committed dependability projects and a requirement for snappy additions inconsistent quality. Considering these components, it is essential that a procedure that takes into consideration refiners to acquire snappy additions in unwavering condition is the need. The A-RCM model and method give refineries a thorough instrument for quickened change in steady.

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